REMARKS – General

Applicants have previously rewritten all claims to define the invention more particularly and distinctly so as to overcome the rejections and define the invention patentably over the prior art.

This response will cover four topics. First, applicants will provide another description of the invention and explain why it is patentable. Second, applicants will demonstrate why the referenced patent, Makivic, is not prior art. Third, after showing why the application overcomes §102 objections, applicants will demonstrate patentability referring to §103. Finally, applicants will request that a patent be granted in light of the significant time available to examiners and the inapplicability of other material as prior art.

Further Description of Invention

Although the specification describes the invention, it is possible that further discussion of the invention's benefits may provide additional clarity to the examiner.

The invention is the method/system of creating and using relative frames of reference for storing and/or retrieving option data from a database. The invention utilizes a database that contains data sets including historical option data and historical data on underlying securities. There is a large body of prior art for databases of historical data for assets such as stocks or futures. There is also prior art in the field of historical option databases. That information and the physical database do not comprise the invention. The invention is the process and/or system enabling users to query the database based on criteria that describe a relationship between characteristics of the option and its underlying asset, time or other options in the database that may or may not be on the same underlying asset.

The need for relative frames of reference comes about because an option is a derivative security and thus depends on the value of its underlying asset(s) and its time until expiry. Even if one has a complete specification of an option along with a market price, this information is useless to an analyst without the price of the underlying. An analyst will then use both prices to evaluate the option price. Option prices only make sense in the context of their relative proximity to the price of the underlying asset and their time to expiry. Furthermore, many of the key concepts and utility of option pricing is the relationship of option pricing (including implied volatility) between options of different strikes, expirations and underlying securities. These relationships are relative not absolute. An example follows.

Example

A common question that traders and analysts pose is how a 10% out of the money put relates to a 10% out of the money call. This type of relationship is termed "skew." In this case, consider an underlying with a price of 100. The user would want to know how the implied volatility of the put with a strike of 90 (10% below 100) relates to a call with a strike of 110 (10% above 100). A prior art database would allow the user to query for the 90 put and the 110 call for a particular underlying with a particular expiration date. Applicants' invention allows the user to query based on the user's criteria of being 10% out of the money. This becomes a critical and unique advantage for three reasons. First, the user does not need to specify the market price of the underlying to the system in order to determine which strikes are of interest. Second, the user might be interested in obtaining the measure for a large number of underlying assets. Each individual underlying asset will likely have different market prices requiring calculations for the appropriate strikes. It would be impractical to write individual queries for each underlying. Third, the invention applies to historical data, i.e., a time series. At each point in time the market price of the underlying changes. Therefore a standard database requires a new query for each point in time accommodating changing the underlying price and consequently strikes. Again, it would be impractical to construct an individual query for each day using prior art. A simplified example is illustrated in Table 1. Applicants provide a method and system to overcome these and other limitations of the prior art.

Table 1

Day	Underlying Price	Options Desired by Analyst	Options Retrieved by Invention	Options Retrieved by Prior Art
1	100	90 Put	90 Put	90 Put

		110 Call	110 Call	110 Call
2	110	99 Put 121 Call	99 Put* 121 Call*	90 Put 110 Call
3	120	108 Put 132 Call	108 Put* 132 Call*	90 Put 110 Call

*Listed options do not always have every strike available. For instance, there might not be options struck at 99 or 121. Instead the invention would return an appropriately interpolated value.

The Rejection of Claims 75-110 on Makivic is Overcome

The last O.A. rejected independent claims 75-110 on Makivic referring to 35 USC §102. Makivic teaches a method and system for calculating theoretical option prices using Monte Carlo techniques. Makivic further provides a mechanism for analyzing historical data on the underlying asset for the purposes of estimating parameters to be used in said simulations. Applicants request reconsideration of this rejection applicable to claims 75-110, for the following reasons:

1. Neither Makivic nor any other prior art teach a means to determine relative reference value(s) for each option in a plurality of options.
2. Neither Makivic nor any other prior art teach a means to retrieve option data using relative reference criteria for the purpose of historical option data analysis.
3. Even if Makivic contained the features of determining relative reference values and having a means to retrieve data based on said criteria, §102 provides for identical devices having different purposes to be novel.
4. These novel features of claims 75-110 produce new and unexpected results and hence are unobvious and patentable over this reference.

Makivic Does Not Teach a System and Method for Analyzing Historical Option Market Data Using Relative Frames of Reference

Makivic teaches a system and method for using a single set of Monte Carlo simulations to calculate the price and risk sensitivity for a single option or structure. The main purpose of Monte Carlo simulation is to provide an option valuation technique useful when standard methods are unusable. Such securities may not be listed on an exchange, may not have historical market pricing or may not yet exist (the analyst or trader using the invention of Makivic may be pricing a potential security). Monte Carlo methods are not used to analyze relationships between market observed option pricing either on the same underlying or on a comprehensive set of underlying instruments. Monte Carlo simulations in general and specifically as described by Makivic do not allow for analyses of historical volatility surfaces over time and across various and multiple classes of options. The uses and the functionality described by Makivic are completely different from those described by applicants and therefore cannot be considered prior art.

As part of the process described by Makivic, a user has access to historical data for the underlying asset. Column 3, lines 3-10 refers to this historical data and it is clear from Figures 2-4 that the data is comprised of underlying data only and not options data. Figure 2 is a graph of the price of an underlying asset QDQ. Figure 3 displays a histogram of log returns for the underlying asset QDQ with a Gaussian fit. Figure 4, is another histogram of log returns for the underlying asset QDQ with an actual fit. Figure 5 shows calculated option prices and error ranges graphed against underlying prices (column 24, lines 9-14). This is analysis of the quality of the options pricing technique Makivic proposes for valuing individual option structures. It is distinctly different to allow a user to "perform simulations" which is referring to the Monte Carlo technique and applicants' functionality to allow a user to query a database based on relative reference criteria. The historical data mentioned thus does not in any way relate to the way applicants' invention stores and utilizes historical data and cannot be considered prior art.

Makivic discusses a plurality of option characteristics (column 8, lines 19-25) for the purpose of calculating a theoretical price for a specific derivative but makes no allowance for the storage of such in a database. As part of what is claimed (Column 25, lines 1-3) Makivic claims to have a database with historical data on an option. However, applicants cannot find any reference to or description of any such historical data in the specification. In the case of Makivic, the purpose of the database is not clear. It is possibly an example of

prior art described by applicants and definitely does not refer to or describe functionality that can be achieved with relative reference analysis.

Makivic does not teach determining one or more relative reference values for each option in a plurality of options. The referenced text (column 18, lines 6-45) makes no mention of any method of referencing historical data in general or option data in particular. Only vague expressions are used to discuss database access in this passage, such as "manipulating the input data." Specific reference is made to the historical database in column 17, lines 34-40. However, no mention is made of any type of data referencing in general or specifically relative reference analysis as described by applicants. Therefore Makivic cannot be considered prior art.

Finally, Makivic makes no provision for identifying options based on relative reference criteria. As part of the claims (Column 25, lines 1-15) Makivic makes mention of a database that contains "historical data on an option" but does not describe what such data is or how it might be stored or accessed. Makivic in particular is designed to work on the problem of a single option or structure at a single point in time. The main outputs of Makivic are calculated option values and related metrics based on Monte Carlo simulations. It is this output which is graphed in Figure 5. Figure 5 is not output of historical option data. This contrasts with applicants' invention, which is designed to work with time series data of market data for a plurality of options. Intermediate data is output in Figures 2-4 which are discussed above. Since there is no description of a means for identifying user requested option data, one must presume that Makivic relies on prior art option databases. Such databases do not have relative reference criteria as described by applicants.

Makivic Does Not Teach Method for Analyzing Historical Equity Option and Equity Linked Securities Using Relative Frames of Reference

Makivic explicitly addresses the ability to run Monte Carlo simulations and display historical analysis of the underlying asset for equity, equity index and equity linked securities. Claims 76, 82, 88, 94, 100 and 106 are dependent claims that refer to independent claims whose patentability has been addressed above. Makivic does not discuss or teach using relative frames of reference for any purpose generally or for the specific purpose of analyzing historical option market data based on equity, equity index or equity linked assets.

Makivic Does Not Teach Method for Analyzing Historical Option Market Data for a Comprehensive Set of Underlying Instruments

Makivic makes no discussion of historical option market analysis. For what is specified, Makivic allows the user to perform time series analysis for underlying asset prices one at a time. While Makivic provides for the capability of performing calculations and analysis for a wide variety of assets, Makivic specifies the user's capability to work on one structure at a time. Claims 77, 83, 89, 95, 101 and 107 are dependent claims that refer to independent claims whose patentability has been addressed above. Neither historical option market data analysis nor utilization of relative frames of reference is taught by Makivic for either single underlying instruments or a comprehensive set of underlying instruments.

Makivic Does Not Teach Method for Analyzing Historical Option Market Data Including Implied Volatility

In column 3, lines 1-2, Makivic refers to the capability of calculating an implied volatility. Nor is Makivic the only prior art for calculating implied volatility. Neither Makivic nor other prior art integrate calculating implied volatility for a combined database of underlying asset and option data with the ability to query using relative referencing.

Material in Claims 79, 85, 91, 97, 103 & 109 are not Discussed by Makivic

Examiner states that the above listed claims are described by Makivic in figures 2-5. These claims discuss the ability of applicants' invention when queried for relative reference criteria to either: 1) return a single option, 2) return a range of options that satisfy the criteria or 3) return an interpolated or extrapolated value. Figures 2-4 refer to underlying asset data. Figure 2 is a time series graph of the underlying asset's price. Figures 3 & 4 show the underlying asset's distribution as histograms. Figure 3 also shows a Gaussian best fit distribution and Figure 4 shows the actual distribution. Figure 5 shows calculated option values graphed

versus asset price. None of these address queries made on an historical option database nor do the figures address user queries based on relative reference criteria.

Claims 80, 86, 92, 98, 104 & 110 are not Discussed by Makivic

The above mentioned claims reference the capability of applicants' invention to produce reports that are functions of option characteristics. Said reports are queried using relative referencing. Columns 7-8 in Makivic are dedicated to reviewing Monte Carlo techniques, explaining how to calculate partial derivatives of the calculated price (risk parameters) in a single simulation and discussing how to calculate results for multiple parameters in single simulations. In short, Makivic does not discuss database access in this section and therefore does not represent prior art.

Even if Makivic contained the features of determining relative reference values and having a means to retrieve data based on said criteria, §102 provides for identical devices having different purposes to be novel

The two inventions differ both in specification and in purpose. However, even if Makivic and applicants' invention were construed to be identical, §102 allows for two inventions that would otherwise be indistinguishable to both be patentable if a new usage is given for the latter application. The purpose of the current invention is to provide a new method and computer system for analyzing option market data. The method's current preferred embodiments are meant to translate absolute strikes and expiration dates to a relative frame of reference matching market participants' needs. In particular, the preferred embodiment provides access to option market data based on different metrics of option money-ness, or deviation of the strike price from the underlying market price, and time until expiration. The overall object of Makivic is the calculation of a theoretical price and risk sensitivities using Monte Carlo techniques. And while one of the listed objects is "quantitative analysis" (column 2, line 61), this is a very broad object intended to support the various monte carlo techniques proposed. In fact, it can be clearly concluded that since historical option data is mentioned only in the claims not the specification and is done without any provision for producing a mechanism described by applicants, that historical option market analysis is not one of the objects of Makivic.

These novel features of claims 75 and 93 produce new and unexpected results and hence are unobvious and patentable over this reference.

Although the groundbreaking Black-Scholes equation assumes that all options for a given underlying have the same implied volatility, the market has produced different results. That is, implied volatility varies by strike and time. How and why that variation occurs is of considerable interest to option traders and academics. The Applicants' invention provides a method and system for finding and measuring those relationships over time.

Amongst the new and unexpected results are:

- the ability to provide easily obtainable measurements of volatility skew and kurtosis as a time series; that is, measuring the variation of implied volatility between strikes of the same maturity
- the ability to compare such measurements between different underlying securities and across maturities
- the ability to monitor option pricing for spreads (combinations of options) that are based on relative reference. For example, the ATM call vs. two 110% OTM calls.
- the ability to examine option characteristics based on relative time periods, e.g., days until expiration

Financial services, in general, and option trading in particular are extremely competitive businesses. Traders are continually seeking advantages over other participants. Not only are the traders seeking advantages, but there are firms which provide traders with data services that are working to distinguish themselves from other such firms. These can be very well capitalized and aggressive firms such as Bloomberg LP, Reuters and Thomson Financial. It should be noted that even though the Chicago Board Options Exchange was founded in 1973, none of these firms nor others was able to deliver such a clearly sought product prior to Applicants. It is significant that this has occurred in a field that has considerable resources and is known to pay high prices for marginal advantage.

This type of product has achieved commercial success subsequent to the filing of this application. Unfortunately, it has not been the success of the Applicants due to lack of funding. However, after both the founding of Applicants' firm and filing of this patent application, at least two firms are in the business of supplying subsets of the capabilities of the Applicants' invention. These firms are iVolatility and OptionMetrics. Bloomberg LP has recently added similar capabilities into their "Professional Product."

The invention solves a long felt and unsolved need. Reviewing price charts is widely practiced by traders and the community has sought such data for option markets. In addition, prior to the invention, much of the historical option price action memory has been concentrated in the traders who make markets on those options. The invention provides other traders perspective in the markets they wish to trade so that those traders have a necessary level of knowledge to act. Risk managers have shown interest in the invention to properly margin traders and to gain insight into market activity.

Conclusion

For all of the above reasons, applicants submit that the specification and claims are now in proper form and that the claims all define patentably over the prior art. Therefore, they submit that this application is now in condition for allowance, which action they respectfully solicit.

Very respectfully,

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